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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/917,549	07/27/2001	Harald Richter	W&B-INF-701	4007

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EXAMINER	
OLSEN, ALLAN W	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 10/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/917,549	RICHTER ET AL.	
	Examiner	Art Unit	
	Allan Olsen	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 August 2004* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6,080,529 issued to Ye et al. (hereinafter, Ye) in view of U.S. Patent 5,986,344 issued to Subramanion et al. (hereinafter, Subramanion)

Ye teaches a method of anisotropically etching interfacial organic polymer layers. Ye teaches that the preferred etchant consists of hydrogen and nitrogen, however, Ye also teaches that additives may be included to improve the etching profile or to control residue (column 20, lines 46-67). Ye teaches etching low k dielectric materials such as SiLK, FLARE and BCB (column 19, lines 52-58; column 23, lines 5-24). Ye teaches that an underlying layer of silicon dioxide or tantalum nitride functions as etch stop layer when an overlying organic layer is etched (column 12, lines 38-42).

Ye does not teach using FLARE as an ARC or that the polymeric organic interfacial layer being etched functions as an ARC.

Subramanion teaches that FLARE functions as an ARC.

It would have been obvious to one skilled in the art to use an FLARE as an ARC in the method of Ye because Ye teaches using an ARC to improve the resolution of a pattern and Ye is directed to a method of etching FLARE which is a material that Subramanion teaches functions as an ARC.

With respect to the 1:50 selectivity, the examiner notes Ye teaches that silicon dioxide functions as an etch stop (i.e., selectivity $\rightarrow \infty$) when an overlying organic material is etched. Furthermore, Ye and Subramanion make applicant's claimed invention obvious. As such, when conducting this method made obvious by Ye and Subramanion, the skilled artisan, would be expected to achieve the claimed results.

Ye does not teach using a MERIE, ECR, ICP or helicon plasma apparatus.

It would be obvious to one skilled in the art to use a MERIE, ECR, ICP or helicon plasma apparatus because each of these apparatus are known for providing a higher density plasma which provides for faster etching rates and high etching selectivity, as well as the ability to use a lower plasma source power which in turn reduces plasma damage to the workpiece.

In regards to the limitations that pertain to process conditions such as flow rates, chamber pressure and magnetic field strength, it is noted that process parameters such as these are considered to be cause effective variables, which may be optimized through routine experimentation. As such, claims to specific values of such parameters cannot provide the basis for patentablity.

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ 233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Response to Arguments

Applicant's arguments filed August 5, 2004 have been fully considered but they are not persuasive. With respect to Ye, applicant argues:

"the etch stop layer located beneath the high-temperature organic-based patterned mask material (layer 220) is a tantalum nitride layer (layer 218) which is used as an etch stop layer when etching the high-temperature organic-based layer 220. A silicon dioxide layer 222 which is provided over the high-temperature organic-based layer, however, is used as an etch stop layer when removing the residual photoresist imaging layer 224 on top of the high-temperature organic-based layer. The etching criteria with respect to the removal of a photoresist imaging layer are, however, completely different from the etching criteria with respect to etching an organic-based layer, in particular an ARC layer as carried out in accordance with the invention of the instant application. For example, the removal of the residual photoresist imaging layer is carried out isotropically in contrast to an anisotropic dry etch process used for etching the organic-based layer, in particular an ARC layer provided on a silicon dioxide layer, in which the etchant contains 80% hydrogen and nitrogen and achieves a selectivity of more than 1 to 50% with respect to the silicon dioxide layer."

The examiner does not disagree with the first two sentences that end with "organic-based layer" at the beginning of line 6. However, the examiner takes exception with the latter portion of applicant's argument as specifically noted below.

Regarding applicant's statement:

> "The etching criteria with respect to the removal of a photoresist imaging layer are, however, completely different from the etching criteria with respect to etching an organic-based layer, in particular an ARC layer as carried out in accordance with the invention of the instant application that suggest that the etching of photoresist."

The examiner notes that photoresist and FLARE are both organic materials. Ye teaches etching FLARE and etching photoresist with a hydrogen/nitrogen based etch chemistry. Furthermore, Subramanion (column 5, lines 58-62) notes that the etching characteristics of photoresist and FLARE are similar to each other and these characteristics differ from the etching characteristic of silicon dioxide.

Applicant then argues:

> "the removal of the residual photoresist imaging layer is carried out isotropically in contrast to an anisotropic dry etch process used for etching the organic-based layer"

However, Ye teaches the opposite. Specifically, Ye teaches removing the photoresist with an anisotropic etching process (column 12, lines 44-45).

Lastly, even if the above arguments were compelling, it is noted they fail to recognize that the combination of Ye and Subramanion make it obvious to dispose a layer of FLARE as an ARC over the silicon dioxide layer (see for example, figure 3a of Subramanion and column 3, lines 21-25).

Conclusion

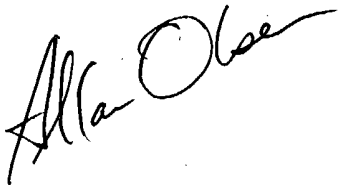
THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 571-272-1441. The examiner can normally be reached on M-F 1-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Greg Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allan Olsen
Primary Examiner
Art Unit 1763